CANKERWORMS

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CANKERWORMS

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Cankerworms have been known as pests in North America since colonial days. These insects are native to our country, though the name "cankerworm" originated in Europe several centuries ago and was applied to several other different species of caterpillars. Two distinct but closely related insects are referred to as cankerworms in the United States. One is known as the fall cankerworm (*Alsophila pometaria* (Harris)) because the adults or moths commonly appear in the fall. The other is called the spring cankerworm (*Paleacrita vernata* (Peck)) because the moths emerge in the spring. Both species feed as larvae, or caterpillars, on the leaves of a great variety of deciduous forest, shade, and fruit trees, such as elm, oak, hickory, ash, maple, beech, linden, and apple. Throughout those parts of the United States where cankerworms occur they appear at times in enormous numbers, and trees may be entirely stripped of leaves (see cover illustration).

Where Cankerworms Occur

The fall cankerworm occurs throughout the northeastern part of of the United States, from Maine to North Carolina, and west to Minnesota and eastern Kansas. It is also present in North Dakota, Montana, Colorado, Utah, and California, and along the southern border of Canada from Nova Scotia to Manitoba.

The spring cankerworm occurs throughout the same territory as the fall cankerworm, except that it is not found as far west along the border between the United States and Canada. In the central part of the United States its range extends somewhat farther in a southwesterly direction than does the main range of the fall species, so it is found in Arkansas, Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, and Colorado. It is also found in California.

Different Stages and Their Life Habits

Cankerworm moths are brownish gray. The males have a wing expanse of about an inch and are active flyers (figs. 1, *D*, and 2, *B*). The females are quite different in appearance since they do not have wings (figs. 1, *G*, and 2, *C*). Because of this wingless condition the females are rather helpless and must depend on their legs to move slowly up the trunks and branches of trees to places where they lay their eggs.

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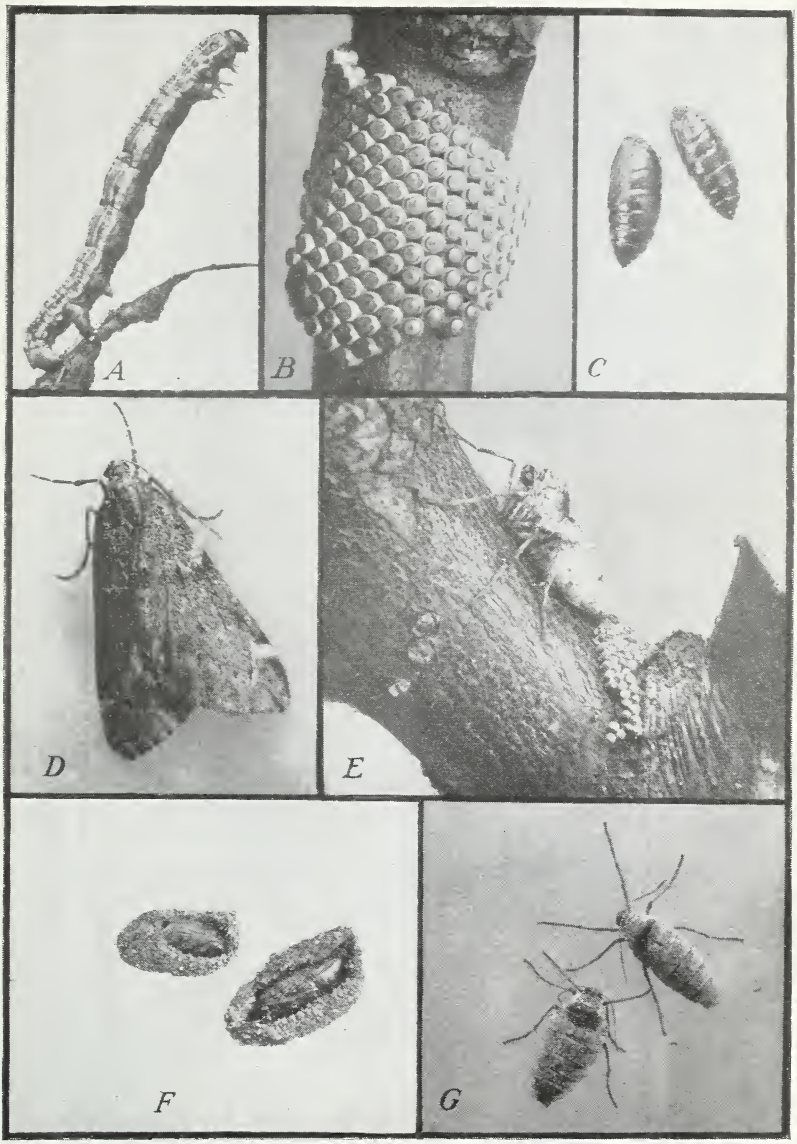

FIGURE 1.—Various stages of the fall cankerworm. *A*, Full-grown larva (× 2½); *B*, cluster of eggs (× 7); *C*, pupae (× 2¼); *D*, male moth (× 3); *E*, female moth laying eggs (× 3); *F*, pupae in cocoons in the soil (× 1¾); *G*, female moths (× 2¼). All are enlarged, the rates of enlargement being shown by the figures in parentheses.

Although the moths of the fall cankerworm begin to emerge late in the fall, they continue to appear at intervals throughout warm periods in winter and early in the spring in some sections. The moths of the spring cankerworm may occasionally emerge during warm winter periods, but for the most part they issue early in the spring. Females of both species usually lay their eggs a few days after they emerge.

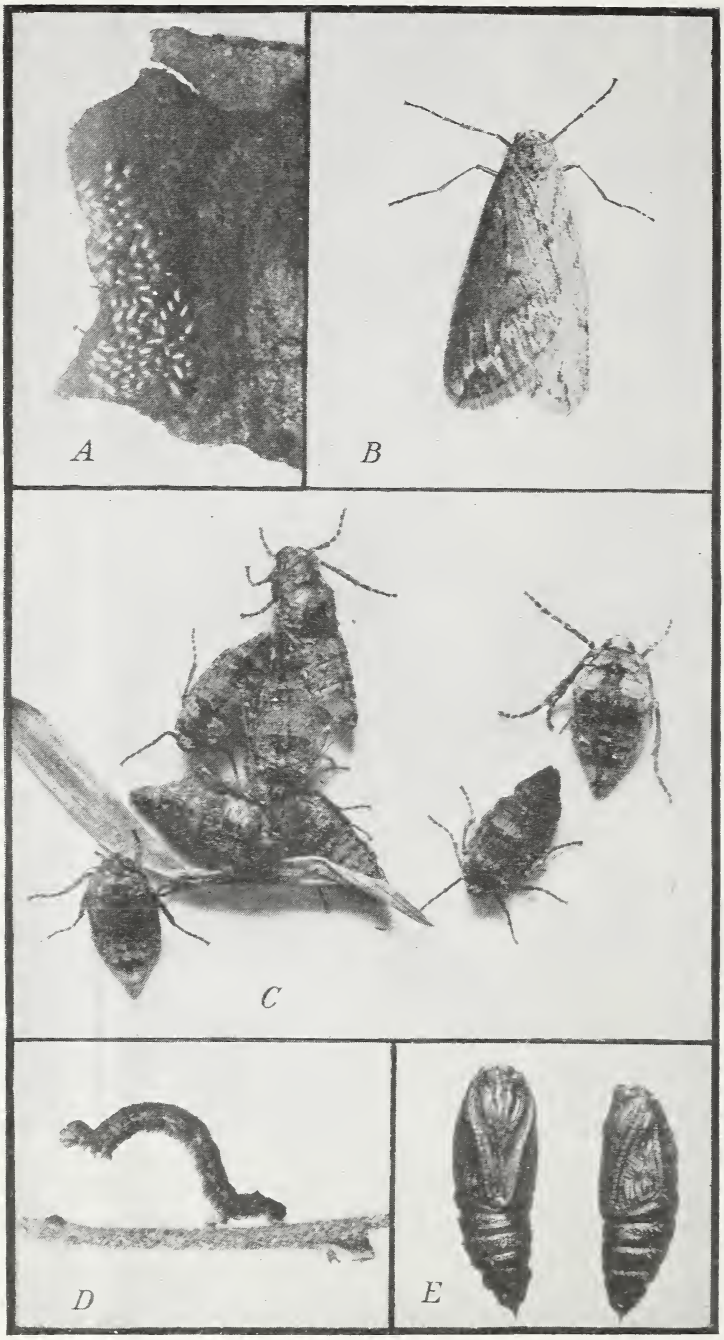

FIGURE 2.—Various stages of the spring cankerworm. *A*, Eggs on inner surface of a piece of bark (× 3½); *B*, male moth (× 2½); *C*, female moths (× 3½); *D*, partly grown larva (× 3); *E*, pupae (× 4). All are enlarged, the rates of enlargement being shown by the figures in parentheses.

The minute eggs of the fall cankerworm (fig. 1, *B*) have the shape of a flowerpot and are brownish gray. The female places them in a compact single layer on the bark of twigs and branches (fig. 1, *E*). The clusters average about 100 eggs and often encircle twigs in the upper parts of the trees. The eggs of the spring cankerworm (fig. 2, *A*) are oval and look like dull pearls. They are usually laid in crevices in the bark in loose, irregular clusters averaging about 50 eggs.

Cankerworm caterpillars are slender worms that measure approximately three-fourths of an inch in length when full-grown. They vary in color and may be pale green, dark gray, brown, or nearly black, with pale whitish lines running lengthwise of the body. Because of their method of moving about, the caterpillars are often referred to as loopers, inch worms, or measuring worms. They drop downward on silken threads when disturbed and sometimes cause annoyance because of this habit. Each larva, or caterpillar, has three pairs of legs on the underside of the body just back of the head and two pairs of prolegs near the hind end. The larva of the fall cankerworm has, in addition, a pair of smaller rudimentary prolegs in front of the two pairs present near the hind end (fig. 1, *A*); these are lacking on the larva of the spring cankerworm (fig. 2, *D*).

Cankerworm eggs hatch early in the spring, and the young caterpillars immediately begin to feed on the tender unfolding leaves. The larvae gradually increase in size and after 30 or 40 days, during which they molt their skins three or four times, they become full-grown and enter the soil. Here they transform to pupae (figs. 1, *C*, *F*, and 2, *E*). The moths emerge from these pupae the following fall or spring. The pupae of both species are brown and about a third of an inch long.

Natural Checks to Cankerworm Increase

In tracing the history of cankerworm outbreaks back to colonial times, it is noted that an outstanding feature is the recurrence of extremes of abundance and scarcity. The caterpillars are present in enormous numbers for a few years and then disappear almost completely. Various factors have been reported as responsible for their disappearance. Cold, stormy weather immediately after the caterpillars have hatched has at times apparently destroyed sufficient numbers so that the remainder did not cause noticeable damage. Natural enemies, such as insects, spiders, birds, and diseases, at times take a heavy toll of all stages through which cankerworms pass during their life cycles. Starvation also reduces their numbers in areas where the caterpillars are so exceptionally abundant that they consume all available food before reaching maturity. However, when cankerworms are abundant it is advisable to control them by artificial means rather than to wait in expectation that natural control factors will reduce them to negligible numbers during that or the following year. Not only do they mar the appearance of trees by stripping them of foliage, but such attacks prevent the trees' normal growth. There is also evidence that the defoliation, especially if continued for a few years, so weakens the trees that they are more susceptible to attack by bark-boring and wood-boring insects than are trees that have not been defoliated. An instance of this is found in the case of oaks which have first been severely defoliated by cankerworms and later attacked and killed by the two-lined chestnut borer (*Agrilus bilineatus* (Web.)).

How to Control Cankerworms

Spraying

Cankerworms are never injurious in orchards that are properly and regularly sprayed for the control of the codling moth (*Carpocapsa pomonella* (L.)). On trees that are not sprayed in the spring for the control of the codling moth or of leaf-chewing insects, preventive or control measures must be used if cankerworms are abundant and injury by them is to be avoided. In such cases, spraying the foliage with a poison spray such as lead arsenate is recommended. To prepare the spray, mix powdered lead arsenate with water in the propor-

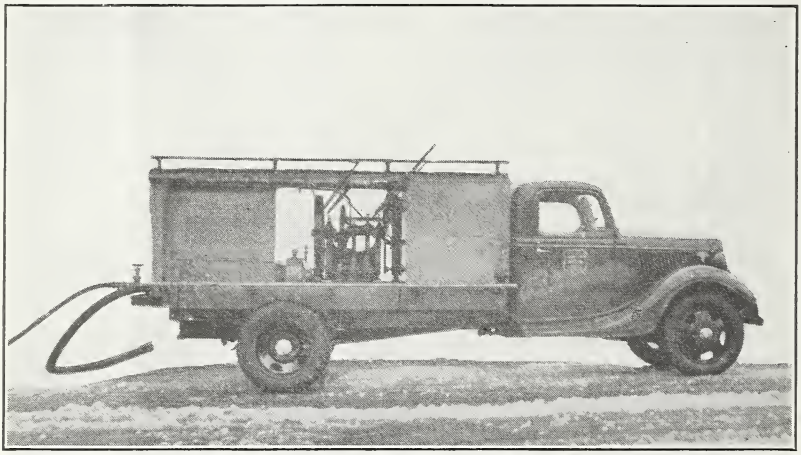

FIGURE 3.—One type of high-powered spray machine used for spraying tall trees.

tion of 3 pounds to 100 gallons; then 12 ounces of either fish oil or linseed oil (4 ounces, or one-fourth pint of the oil for each pound of lead arsenate) should be thoroughly stirred into the mixture to make the spray stick to the leaves. For small quantities, use 3 level tablespoonfuls of lead arsenate and 1 tablespoonful of oil in 1 gallon of water. Fish oil has strong odor, which disappears a few hours after the spray mixture has been applied. Where this odor is considered objectionable, use linseed oil. When spraying with mixtures in which either of the oils is used, be careful to keep the spray from reaching the surfaces of buildings, or staining will result. Such staining can be avoided, however, if the buildings are drenched with water from a garden hose before the spraying is done and again immediately after the spray mixture is applied, before it has dried.

Spraying for the control of cankerworms, as for the control of other insects, must be done thoroughly. Proper spray apparatus must be used; for tall trees this means sprayers capable of giving adequate pressure (figs. 3 and 4). Because cankerworm caterpillars begin feeding when the leaf buds are unfolding, the spray should be applied as soon as the leaves have developed sufficiently to catch and hold the spray.

Spraying woodland areas is difficult and costly. Recent experiments have indicated that the application of concentrated spray mixtures from an autogiro is practical in such areas, although there

is need for further development of apparatus and insecticides for this purpose.

Where trees are sprayed in pastures or grazing areas it is advisable to fence off and exclude livestock from such areas for the remainder of the season to avoid any danger of livestock poisoning.

FIGURE 4.—Men on a hose line spraying trees that are at a distance from the spray machine.

Using Mechanical Barriers

Since female cankerworm moths cannot fly, the banding of tree trunks with a material that will prevent the moths from ascending the trees to lay their eggs has long been suggested as a means of control. A sticky tree-banding substance has been most commonly recommended for this purpose, and material of this type is now on the market. When spraying is impracticable, the use of such bands is recommended. Their value is sometimes lessened by the fact that the small caterpillars, hanging on silken threads, may be carried

considerable distances by the wind and thus infest the banded trees if unprotected infested trees are nearby.

For best results the sticky bands must be put on in the right way and at the proper time and their surfaces kept sticky. If the bands are neglected and the moths permitted to crawl over them, these mechanical barriers will be of litle use.

For the fall cankerworm, put the sticky bands in place at least by the middle of October and keep them in good condition until the ground is thoroughly frozen. When there is a severe infestation, renew the bands as soon as the ground thaws with the first warm days of late winter or early spring and keep them in effective condition until the apple blossoms have fallen. For the spring cankerworm, put the bands in place with the first thawing of the ground in February or March and keep them effective until the apple blossoms have fallen. To keep the bands effective, examine them at intervals and stir the surface with a putty knife or thin hardwood paddle to free it of foreign material and keep it sufficiently sticky to prevent the moths from crawling over it.

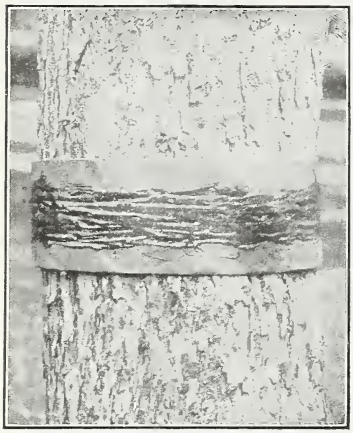

FIGURE 5.—Sticky tree-banding material placed on a strip of heavy paper drawn tightly around the trunk of the tree, with cotton batting underneath to fill all crevices and openings.

Where the sticky mixture is applied directly on the bark it will leave a dark streak around the tree, and this band may remain evident for a number of years. On thin-barked trees the banding material may in some cases also injure the tree. To avoid this type of disfiguration and danger of injury a safe and satisfactory band may be made from cheap cotton batting and single-ply tarred building paper, on which the sticky mixture is applied (fig. 5). Cut the cotton into strips about 2 inches wide and wrap it around the tree trunk. Over the cotton place a strip of tarred paper about 5 inches wide, drawing it tightly and tacking it securely where it overlaps. Then spread the sticky material on top of the paper. Carefully plug all crevices under the paper band with cotton and inspect the bands at intervals to see that there are no small openings where the female moths or young caterpillars could crawl through beneath the band.

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